PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Martin E. LEE

Application No.: Rule 53(b) Divisional of 09/437,608 filed November 10, 1999

Filed: June 15, 2001 Docket No.: 102305.05

For: GUIDELESS STAGE WITH ISOLATED REACTION STAGE

PRELIMINARY AMENDMENT

Director of the U.S. Patent and Trademark Office
Washington, D.C. 20231

Sir:

Prior to initial examination on the merits, please amend the above-identified application as follows:

IN THE CLAIMS:

Please cancel claims 1-33 without prejudice to or disclaimer of the subject matter contained therein.

Please add the following claims 34-157:

--34. (new) A method of making a microlithography system that forms an image onto an object, comprising the steps of:

providing an irradiation apparatus that irradiates the object with radiation to form the image on the object;

providing a movable stage associated with the irradiation apparatus;

providing a first support structure;

providing a second support structure dynamically isolated from the first support structure;

providing a drive to move the movable stage such that a reaction force exerted by the movement of the movable stage is transferred to the first support structure; and

providing a position detector to detect a position of the movable stage, the position detector being supported by the second support structure.--

--35. (new) A method according to claim 34, wherein the second support structure supports the irradiation apparatus.--

--36. (new) A method according to claim 35, wherein the irradiation apparatus includes a projection system.--

--37. (new) A method according to claim 36, wherein the projection system optically projects the image.--

--38. (new) A method according to claim 36, wherein the movable stage is located below the projection system.--

--39. (new) A method according to claim 35, wherein the irradiation apparatus includes a mask holder that holds a mask that defines the image.--

--40. (new) A method according to claim 34, wherein the second support structure has a first portion that supports the movable stage and a second portion that supports the irradiation apparatus.--

--41. (new) A method according to claim 40, wherein the first portion and the second portion are connected rigidly to each other.--

--42. (new) A method according to claim 36, wherein the position detector projects a light beam to a first mirror fixed to the movable stage and to a second mirror fixed to the projection system.--

--43. (new) A method according to claim 34, wherein the movable stage is a guideless stage having no associated guide member to guide its movement.--

--44. (new) A method according to claim 34, wherein the movable stage is a substrate stage on which the object is supported.--

--45. (new) A method according to claim 34, wherein the movable stage is provided on the second support structure.--

--46. (new) A method according to claim 45, wherein the movable stage is a guideless stage having no associated guide member to guide its movement.--

--47. (new) A method according to claim 46, wherein the second support structure includes a base member, and the guideless stage is movable over a surface of the base member on a bearing.--

--48. (new) A method according to claim 47, wherein the bearing is a non-contact bearing that supports the guideless stage.--

--49. (new) A method according to claim 48, wherein the non-contact bearing comprises an air bearing.--

--50. (new) A method according to claim 48, wherein the non-contact bearing includes a magnet and a cooperating coil.--

--51. (new) A method according to claim 45, wherein the movable stage is a substrate stage on which the object is supported.--

--52. (new) A method according to claim 51, wherein the second support structure includes a base member, and the substrate stage is movable over a surface of the base member on a bearing.--

--53. (new) A method according to claim 52, wherein the bearing is a non-contact bearing that supports the substrate stage.--

--54. (new) A method according to claim 53, wherein the non-contact bearing comprises an air bearing.--

--55. (new) A method according to claim 53, wherein the non-contact bearing includes a magnet and a cooperating coil.--

--56. (new) A method according to claim 34, wherein the second support structure is supported on a foundation.--

--57. (new) A method according to claim 56, further comprising:

providing a block between the foundation and the second support structure.--

--58. (new) A method according to claim 57, wherein the block comprises a vibration absorbing assembly that prevents transmission of vibration from the foundation to the second support structure.--

--59. (new) A method according to claim 56, wherein the foundation is the ground or a base structure.--

--60. (new) A method according to claim 34, wherein the drive comprises a linear motor.--

--61. (new) A method according to claim 60, wherein the linear motor comprises a magnet and a coil.--

--62. (new) A method according to claim 61, wherein the first support structure supports one of the magnet and the coil.--

--63. (new) A method according to claim 34, wherein the drive rotates the movable stage on an axis of the movable stage.--

--64. (new) A method according to claim 63, wherein the drive moves the movable stage based on a detection result by the position detector so as to effect yaw correction.--

--65. (new) A method according to claim 63, wherein the movable stage is a guideless stage having no associated guide member to guide its movement.--

--66. (new) A method according to claim 63, wherein the movable stage is a substrate stage on which the object is supported.--

--67. (new) A method according to claim 34, wherein the drive moves the movable stage in a two dimensional plane, including movement in the plane in a first linear direction, in a second linear direction and in a rotative direction on an axis of the movable stage.--

--68. (new) A method according to claim 67, wherein the drive moves the movable stage based on a detection result by the position detector so as to effect yaw correction.--

--69. (new) A method according to claim 67, wherein the movable stage is a guideless stage having no associated guide member to guide its movement.--

--70. (new) A method according to claim 67, wherein the movable stage is a substrate stage on which the object is supported.--

--71. (new) A method according to claim 34, wherein the first support structure at least partly supports the drive.--

--72. (new) An image forming method that forms an image onto an object, comprising the steps of:

moving a stage;

transferring a reaction force caused by the movement of the stage to a first support structure;

detecting a position of the stage by a position detector that is supported by a second support structure dynamically isolated from the first support structure; and

forming the image onto the object by movement of the stage.--

--73. (new) A method according to claim 72, wherein the image is formed on the object by an irradiation apparatus.--

--74. (new) A method according to claim 73, wherein the irradiation apparatus is a projection system.--

--75. (new) A method according to claim 74, wherein the step of moving the stage includes aligning the stage with the projection system.--

--76. (new) A method according to claim 74, wherein the projection system optically projects the image.--

--77. (new) A method according to claim 74, wherein the second support structure supports the projection system.--

--78. (new) A method according to claim 74, wherein the stage is located below the projection system.--

--79. (new) A method according to claim 77, wherein the second support structure supports the stage.--

--80. (new) A method according to claim 79, wherein the second support structure has a first portion that supports the stage, and a second portion that supports the projection system.--

--81. (new) A method according to claim 80, wherein the first portion and the second portion are connected rigidly to each other.--

--82. (new) A method according to claim 74, wherein the step of detecting a position of the stage comprises projecting a light beam to a first mirror fixed to the stage and to a second mirror fixed to the projection system.--

--83. (new) A method according to claim 72, wherein the stage is a guideless stage having no associated guide member to guide its movement.--

--84. (new) A method according to claim 72, wherein the stage is a substrate stage on which the object is supported.--

--85. (new) A method according to claim 72, wherein the stage is provided on the second support structure.--

--86. (new) A method according to claim 85, wherein the stage is a guideless stage having no associated guide member to guide its movement.--

--87. (new) A method according to claim 86, wherein the second support structure includes a base member and the guideless stage is movable over a surface of the base member on a bearing.--

--88. (new) A method according to claim 87, wherein the bearing is a non-contact bearing that supports the guideless stage.--

--89. (new) A method according to claim 88, wherein the non-contact bearing comprises an air bearing.--

--90. (new) A method according to claim 88, wherein the non-contact bearing includes a magnet and a cooperating coil.--

--91. (new) A method according to claim 85, wherein the stage is a substrate stage on which the object is supported.--

--92. (new) A method according to claim 91, wherein the second support structure includes a base member and the substrate stage is movable over a surface of the base member on a bearing.--

--93. (new) A method according to claim 92, wherein the bearing is a non-contact bearing that supports the substrate stage.--

--94. (new) A method according to claim 93, wherein the non-contact bearing comprises an air bearing.--

--95. (new) A method according to claim 93, wherein the non-contact bearing includes a magnet and a cooperating coil.--

--96. (new) A method according to claim 72, wherein the second support structure is supported on a foundation.--

--97. (new) A method according to claim 96, wherein the second support structure is supported on the foundation with a block between the foundation and the second support structure.--

--98. (new) A method according to claim 97, wherein the block comprises a vibration absorbing assembly that prevents transmission of vibration from the foundation to the second support structure.--

--99. (new) A method according to claim 96, wherein the foundation is the ground or a base structure.--

--100. (new) A method according to claim 72, wherein the stage moves based on a detection result by the position detector.--

--101. (new) A method according to claim 72, further comprising the step of:

effecting yaw correction of the stage.--

--102. (new) A method according to claim 72, wherein the movement of the stage is carried out by cooperation with a first member that is located on the first support member, and a second member that is connected to the stage.--

--103. (new) A method according to claim 102, wherein the first member is one of a magnet and a coil.--

--104. (new) A method of making a positioning apparatus that positions an object, comprising the steps of:

providing a first support structure;

providing a second support structure dynamically isolated from the first support structure;

providing a drive to move the object such that a reaction force exerted by the movement of the object is transferred to the first support structure; and

providing a position detector to detect a positional information of the object, the position detector being supported by the second support structure.--

--105. (new) A method according to claim 104, wherein the second support structure supports the object.--

--106. (new) A method according to claim 104, wherein the second support structure is supported on a foundation.--

--107. (new) A method according to claim 106, further comprising:

providing a block between the foundation and the second support structure.--

--108. (new) A method according to claim 107, wherein the block comprises a vibration absorbing assembly that prevents transmission of vibration from the foundation to the second support structure.--

--109. (new) A method according to claim 106, wherein the foundation is the ground or a base structure.--

--110. (new) A method according to claim 104, wherein the drive rotates the object on an axis of the object.--

--111. (new) A method according to claim 110, wherein the drive moves the object based on a detection result by the position detector so as to effect yaw correction.--

--112. (new) A method according to claim 104, wherein the drive moves the object in a two dimensional plane, including movement in the plane in a first linear direction, in a second linear direction and in a rotative direction on an axis of the object.--

--113. (new) A method according to claim 112, wherein the drive moves the object based on a detection result by the position detector so as to effect yaw correction.--

--114. (new) A method according to claim 104, further comprising:

providing a movable stage to hold the object.--

--115. (new) A method according to claim 114, wherein the drive moves the object via the movable stage.--

--116. (new) A method according to claim 114, wherein the position detector projects a light beam to a first mirror fixed to the movable stage.--

--117. (new) A method according to claim 114, wherein the movable stage is a guideless stage having no associated guide member to guide its movement.--

--118. (new) A method according to claim 114, wherein the movable stage is provided on the second support structure.--

--119. (new) A method according to claim 118, wherein the movable stage is a guideless stage having no associated guide member to guide its movement.--

--120. (new) A method according to claim 119, wherein the second support structure includes a base member and the guideless stage is movable over a surface of the base member on a bearing.--

--121. (new) A method according to claim 120, wherein the bearing is a non-contact bearing that supports the guideless stage.--

--122. (new) A method according to claim 121, wherein the non-contact bearing comprises an air bearing.--

--123. (new) A method according to claim 121, wherein the non-contact bearing includes a magnet and a cooperating coil.--

--124. (new) A method according to claim 114, wherein the drive rotates the movable stage on an axis of the movable stage.--

--125. (new) A method according to claim 114, wherein the drive moves the movable stage based on a detection result by the position detector so as to effect yaw correction.--

--126. (new) A method according to claim 124, wherein the movable stage is a guideless stage having no associated guide member to guide its movement.--

--127. (new) A method according to claim 114, wherein the drive moves the movable stage in a two dimensional plane, including movement in the plane in a first linear direction, in a second linear direction and in a rotative direction on an axis of the movable stage.--

--128. (new) A method according to claim 127, wherein the drive moves the movable stage based on a detection result by the position detector so as to effect yaw correction.--

--129. (new) A method according to claim 127, wherein the movable stage is a guideless stage having no associated guide member to guide its movement.--

--130. (new) A method according to claim 104, wherein the drive comprises a magnet and a coil.--

--131. (new) A method according to claim 130, wherein the first support structure supports one of the magnet and the coil.--

--132. (new) A method according to claim 104, wherein the first support structure at least partly supports the drive.--

--133. (new) A positioning method that positions an object, comprising the steps of:

moving the object;

transferring a reaction force caused by movement of the object to a first support structure;

detecting a position information of the object by a position detector supported by a second support structure dynamically isolated from the first support structure; and

positioning the object based on a detection result by the position detector.--

--134. (new) A method according to claim 133, wherein the second support structure supports the object.--

--135. (new) A method according to claim 133, wherein the second support structure is supported on a foundation.--

--136. (new) A method according to claim 135, wherein the second support structure is supported on the foundation with a block between the foundation and the second support structure.--

--137. (new) A method according to claim 136, wherein the block comprises a vibration absorbing assembly that prevents transmission of vibration from the foundation to the second support structure.--

--138. (new) A method according to claim 135, wherein the foundation is the ground or a base structure.--

--139. (new) A method according to claim 133, wherein the step of moving the object comprises driving the object with a drive.--

--140. (new) A method according to claim 139, wherein the step of driving the object includes rotating the object on an axis of the object.--

--141. (new) A method according to claim 140, wherein the step of positioning the object comprises moving the object based on a detection result by the position detector so as to effect yaw correction.--

--142. (new) A method according to claim 139, wherein the step of driving the object comprises moving the object in a two dimensional plane, including moving the object in first and second linear directions and rotating the object on an axis of the object.--

--143. (new) A method according to claim 142, wherein the step of positioning the object comprises moving the object based on a detection result by the position detector so as to effect yaw correction.--

--144. (new) A method according to claim 133, further comprising:

holding the object on a movable stage.--

--145. (new) A method according to claim 144, wherein the step of moving the object comprises moving the movable stage.--

--146. (new) A method according to claim 145, wherein the step of detecting a position comprises projecting a light beam to a first mirror fixed to the movable stage.--

--147. (new) A method according to claim 145, wherein the movable stage is a guideless stage having no associated guide member to guide its movement.--

--148. (new) A method according to claim 145, wherein the movable stage is provided on the second support structure.--

--149. (new) A method according to claim 148, wherein the movable stage is a guideless stage having no associated guide member to guide its movement.--

--150. (new) A method according to claim 149, wherein the second support structure includes a base member, and the guideless stage is movable over a surface of the base member on a bearing.--

--151. (new) A method according to claim 150, wherein the bearing is a non-contact bearing that supports the guideless stage.--

--152. (new) A method according to claim 151, wherein the non-contact bearing comprises an air bearing.--

--153. (new) A method according to claim 151, wherein the non-contact bearing includes a magnet and a cooperating coil.--

--154. (new) A method according to claim 144, wherein the step of positioning the object comprises moving the movable stage based on a detection result by the position detector.--

--155. (new) A method according to claim 144, further comprising the step of:

effecting yaw correction of the movable stage.--

--156. (new) A method according to claim 144, wherein movement of the movable stage is carried out by cooperation with a first member that is located on the first support member, and a second member that is connected to the movable stage.--

--157. (new) A method according to claim 156, wherein the first member is one of a magnet and a coil.--

REMARKS

Claims 34-157 are pending.

The Examiner is requested to consider the references identified in the attached Information Disclosure Statement, which are of record in the parent application.

Examination and allowance in due course are earnestly solicited.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Mario A. Costantino
Registration No. 33,565

JAO:MAC/ccs

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OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

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